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Name of Principal Author and all other author(s):

James Zouris

Amber Wade

Noelle Gronroos

Principal Author's Organization and address:

Naval Health Research Center
PO Box 85122
San Diego, CA 92186-5122

Phone: (619) 553-8389

Fax:

Email: zouris@nhrc.navy.mil

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Comparison of Combat Casualty Statistics among US Armed Forces during OEF/OIF

James Zouris
Amber Wade
Noelle Gronroos

Naval Health Research Center
Medical Modeling and Simulation and Mission Support

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Objectives

- Background
- Rationale
- Casualty Statistic Comparisons
- Summary



Background

Combat casualty statistics provide important information for use in the prevention, treatment, and estimation of casualties:

- The case fatality rate (CFR) which describes the casualties who have died among all wounded
- The percentage of casualties killed in action (%KIA) which describes immediate deaths among all seriously wounded.
- The percentage of casualties who died of wounds (%DOW) following admission to a medical facility among all seriously wounded.



Rationale

- CFR provides a measure of the overall lethality of the battlefield
- %KIA can be indicative of the effectiveness of current body armor and lethality of various weapons
- %DOW can measure the effectiveness of combat casualty medical care

Why do we care?



User Definitions

- KIA = Deaths before reaching Medical Treatment Facility (MTF)
- WIA = All battle casualties
 - Includes DOW and RTD*
 - Does not include KIAs
- DOW = Those that die after reaching MTF

WIA = WIA Not RTD < 72 hours + DOW + RTD < 72 Hours

*WIA RTDs are defined as those that are WIA but return to duty within 72 hours.



Casualty Rate Formulas*

$$\%KIA = \frac{KIA}{KIA + (WIA - RTD)} \times 100$$

$$\%DOW = \frac{DOW}{(WIA - RTD)} \times 100$$

$$CFR = \frac{[KIA + DOW]}{KIA + WIA} \times 100$$

*Holcomb, J. B., L. G. Stansbury, et al. (2006). "Understanding combat casualty care statistics." The Journal Of Trauma 60(2): 397-401.

WIA = WIA Not RTD < 72 hours + DOW + RTD < 72 Hours

RTD = WIA casualties who RTD < 72 hours

CFR reflects
the overall
lethality in all
those who are
wounded in
conflict.

OPERATION IRAQI FREEDOM (OIF) U.S. CASUALTY STATUS *					
FATALITIES AS OF: January 31, 2007, 10 a.m. EST					
OIF U.S. Military Casualties by Phase	Total Deaths	KIA	Non-Hostile	WIA RTD **	WIA Not RTD **
Combat Operations - 19 Mar 03 thru 30 Apr 03	139	109	30	116	426
Post Combat Ops - 1 May thru Present	2,930	2,361	569	12,821	9,916
OIF U.S. DoD Civilian Casualties	7	6	1		
Totals	3,076	2,476	600	12,937	10,342
OPERATION ENDURING FREEDOM (OEF) U.S. CASUALTY STATUS					
AS OF: January 27, 2007, 10 a.m. EST					
OEF U.S. Military Casualties	Total Deaths	KIA	Non-Hostile	WIA RTD **	WIA Not RTD **
In and Around Afghanistan***	296	192	104	447	658
Other Locations****	56	2	54		1
OEF U.S. DoD Civilian Casualties	1	1			
Worldwide Total	353	195	158	447	659
* OPERATION IRAQI FREEDOM includes casualties that occurred on or after March 19, 2003 in the Arabian Sea, Bahrain, Gulf of Aden, Gulf of Oman, Iraq, Kuwait, Oman, Persian Gulf, Qatar, Red Sea, Saudi Arabia, and United Arab Emirates. Prior to March 19, 2003, casualties in these countries were considered OEF.					
** These columns indicate the number of servicemembers who were Wounded In Action (WIA) and Returned to Duty within 72 hours AND WIA and Not Returned to Duty within 72 hours. To determine the total WIA figure, add the columns "WIA RTD" and "WIA Not RTD" together. These figures are updated on Tuesday unless there is a preceding holiday.					
*** OPERATION ENDURING FREEDOM (In and Around Afghanistan), includes casualties that occurred in Afghanistan, Pakistan, and Uzbekistan.					
**** OPERATION ENDURING FREEDOM (Other Locations), includes casualties that occurred in Guantanamo Bay (Cuba), Djibouti, Eritrea, Ethiopia, Jordan, Kenya, Kyrgyzstan, Philippines, Seychelles, Sudan, Tajikistan, Turkey, and Yemen.					

Combat Casualty Statistics During Combat Operations



	World War II³	Vietnam War³	Desert² Storm	OEF¹	OIF¹
%KIA	20.2%	20.0%	*	18.1%	14.8%
%DOW	3.5%	3.2%	*	5.7%	5.28%
CFR	19.1%	15.8%	23.9%	14.9%	9.6%

1 Casualty reports: US Department of Defense. Available from:

<http://www.defenselink.mil/> as of January 31, 2007

2 <http://siadapp.dmdc.osd.mil/personnel/CASUALTY/castop.htm>

3 Holcomb, J. B., L. G. Stansbury, et al. (2006). "Understanding combat casualty care statistics." *The Journal Of Trauma* 60(2): 397-401.

*WIA casualties who RTD < 72 hours were not available



CFR for OEF and OIF

	2003	2004	2005	2006
OEF	16%	11%	20%	18%
OIF	12%	8%	10%	10%
p-value	0.23	0.21	<.0001	<.0001

In 2005 and 2006 proportion tests demonstrate that the CFR for OEF and OIF are significantly different.



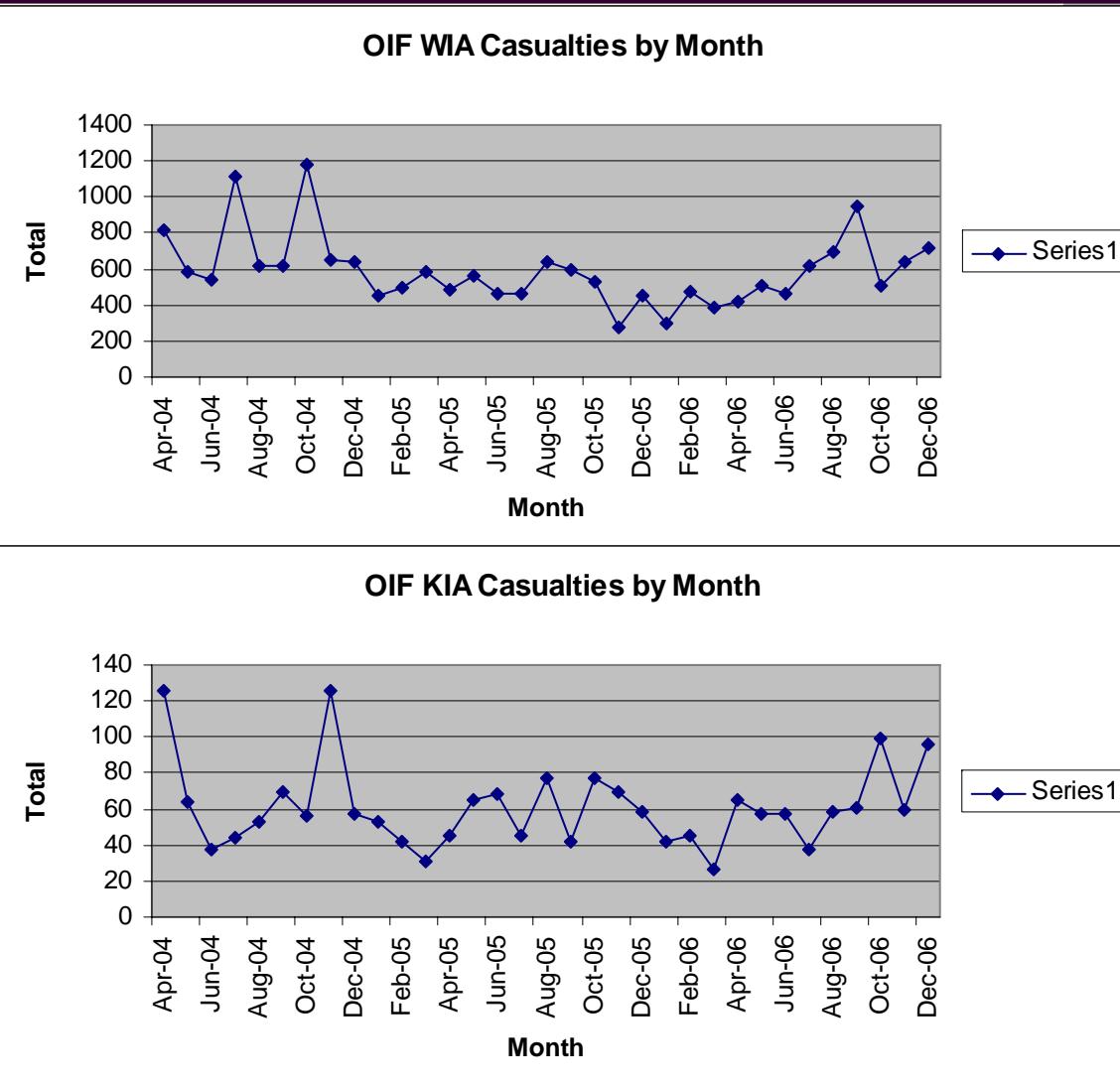
CFR (USMC/USA) for OIF

	2003*	2004	2005	2006
USMC	17%	8%	10%	9%
USA	11%	9%	11%	11%
p-value	< 0.001	0.5	0.64	0.19

*OIF-1 (21 MAR 03 – 30 APR 03) Only

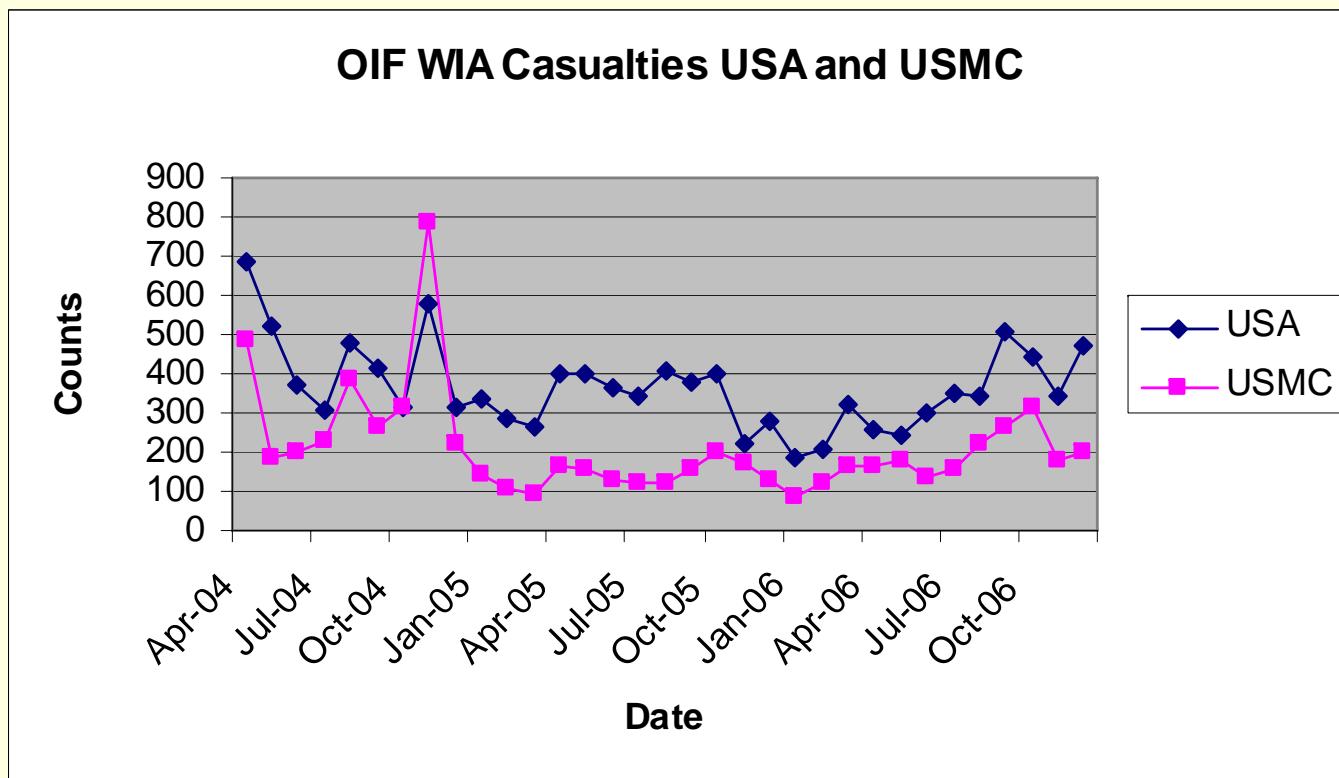
Notice that the rates are not significantly different except for in 2003.

Comparison of WIA and KIA Casualties during OIF





Comparison of USA and USMC WIA Casualties During OIF



MAIN RESULTS



- CFRs have been declining since WWI
- Majority of all deaths are KIA
- CFRs among the USA and USMC are similar
- Although %DOW are similar, the CFRs and %KIA are significantly different between OEF and OIF

Examination of CFR, KIA and DOW for Selected Periods of OIF



OIF- Mar 03- April 03	Army	Marines
CFR	14.69	18.01
KIA	16.35	20.22
DOW	1.82	0.94

Major Combat Phase

April 2004	Army	Marines
CFR	8.98	9.44
KIA	9.54	16.41
DOW	5.76	4.21

Insurgency - One Year Anniversary

Nov 2004	Army	Marines
CFR	7.11	9.25
KIA*	9.21	17.9
DOW*	2.99	3.12

Battle of Fallujah



GLOBAL WAR ON TERRORISM - OPERATION IRAQI FREEDOM

BY CASUALTY CATEGORY WITHIN SERVICE

March 19, 2003 Through May 5, 2007

CASUALTY TYPE	TOTAL	ARMY	NAVY ***	MARINES	AIR FORCE
Killed In Action	2,099	1,408	51	622	18
Died of Wounds*	633	463	1	169	
Died While Missing In Action	7	7			
Died While Captured	2	2			
TOTAL HOSTILE DEATHS	2,741	1,880	62	781	18
<hr/>					
Accident	403	278	10	105	10
Illness	62	52	7	2	1
Homicide	15	10	1	2	2
Self-Inflicted	107	91	3	13	
Undetermined	8	7	1		
Pending**	25	7	3	15	
TOTAL NON-HOSTILE DEATHS	820	445	26	137	13
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TOTAL DEATHS	3,561	2,325	77	928	31
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TOTAL - WOUNDED (WIA)	26,245	18,447	568	7,851	288
Wounded - No Medical Air Transport Required	17,766	11,071	412	6,054	229
Wounded - Medical Air Transport Required****	7,479	5,376	147	1,897	59
TOTAL - NON-HOSTILE-RELATED MEDICAL AIR TRANSPORTS	28,701	22,622	817	2,181	1,171
Non-Hostile Injuries - Medical Air Transport Required****	7,112	5,653	235	934	290
Diseases/Other Medical - Medical Air Transport Required****	19,589	16,969	582	1,257	881
TOTAL - MEDICAL AIR TRANSPORTS (HOSTILE AND NON-HOSTILE)	34,180	27,888	984	4,088	1,230

* Includes died of wounds where wounding occurred in theater and death occurred elsewhere.

** Pending means final category to be determined at a later date.

*** Navy totals include Coast Guard.

**** Reported by Force Health Protection and Readiness

GLOBAL WAR ON TERRORISM - OPERATION ENDURING FREEDOM

BY CASUALTY CATEGORY WITHIN SERVICE

October 7, 2001 Through May 5, 2007



CASUALTY TYPE	TOTAL	ARMY	NAVY ***	MARINES	AIR FORCE
Killed In Action	151	132	15	6	7
Died of Wounds*	41	35		4	2
Died While Missing In Action					
Died While Captured					
TOTAL HOSTILE DEATHS	202	167	16	10	9
Accident	139	94	7	22	16
Illness	11	8	2	1	
Homicide	1			1	
Self-Inflicted	15	11	3	1	
Undetermined	5	4	1		
Pending**	8	4	2	2	
TOTAL NON-HOSTILE DEATHS	179	121	15	27	16
TOTAL DEATHS	381	288	31	37	25
TOTAL - WOUNDED IN ACTION (WIA)	1,217	1,047	10	92	68
Wounded - No Medical Air Transport Required	496	445		19	34
Wounded - Medical Air Transport Required****	719	602	10	73	34
TOTAL - NON-HOSTILE-RELATED MEDICAL AIR TRANSPORTS	5,358	3,979	231	326	822
Non-Hostile Injuries - Medical Air Transport Required****	1,430	1,010	76	133	211
Diseases/Other Medical - Medical Air Transport Required****	3,928	2,969	155	193	611
TOTAL - MEDICAL AIR TRANSPORTS (HOSTILE AND NON-HOSTILE)	6,077	4,581	241	389	856

* Includes died of wounds where wounding occurred in theater and death occurred elsewhere.

** Pending means final category to be determined at a later date.

*** Navy totals include Coast Guard.

**** Reported by Force Health Protection and Readiness.